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[Material Name] Claims 1

[Material Name] Specification 1

[Material Name] Drawings 1

[Material Name] Abstract 1

【Document Name】 Claims

【Claim 1】 A sun visor for an automobile having a shading plate-like core for use in a passenger cabin of the automobile, characterized in that said plate-like core having a plurality of micropores each having a diameter  
5 ranging from 1 to 5 mm, wherein an open area ratio representing a ratio of a total area of said micropores to a projected area of said plate-like core ranges from 2 % to 30 %.

【Claim 2】 The sun visor for an automobile according to claim 1, characterized in that said plate-like core comprises a superposed assembly  
10 of a face side plate and a reverse side plate which have substantially equal contours, said micropores being defined in at least one of said face side plate and said reverse side plate.

【Claim 3】 The sun visor for an automobile according to claim 1, characterized in that said plate-like core comprises a superposed assembly  
15 of a face side plate and a reverse side plate which have substantially equal contours, said micropores being defined in both said face side plate and said reverse side plate, and wherein the micropores defined in said face side plate and said reverse side plate are disposed out of alignment with each other as viewed in a direction perpendicular to a surface of said plate-like core.

20 【Claim 4】 The sun visor for an automobile according to claim 2 or 3, characterized in that said face side plate and said reverse side plate have a hollow space defined therebetween when said face side plate and said reverse side plate are superposed on each other.

【Claim 5】 The sun visor for an automobile according to claim 4,  
25 characterized in that said hollow space defined in said plate-like core is filled with a porous sound absorbent such as felt.

【Claim 6】 The sun visor for an automobile according to any one of claims 1 through 5, characterized in that said plate-like core has an outer surface covered with a covering member having a high air permeability of at least 6 cc/cm<sup>2</sup>/second.

- 5       【Claim 7】 A sun visor for an automobile having a shading plate-like core or a shading skeletal core for use in a passenger cabin of the automobile, characterized in that said plate-like core or said skeletal core having an outer surface covered with a covering member having a high air permeability of at least 6 cc/cm<sup>2</sup>/second.

**【Document Name】** Specification

**【Title of the Invention】** Sun visor for automobiles

**【Field of the Invention】**

**【0001】**

5           The present invention relates to a shading sun visor for automobiles, and more particularly to a sun visor with a sound absorbing function for automobiles.

**【Background Art】**

**【0002】**

10           Heretofore, various shading sun visors are mounted on the ceilings of automobile cabins along front and side windshields for protecting occupants against glares.

**【0003】**

15           A sun visor of the above type has a plate-like core (sun visor core) as a shading member and a support shank by which the sun visor core is angularly movably supported on the ceiling. When not in use, the sun visor is retracted out of the way with the sun visor core held against the ceiling. When in use, the sun visor is rotated to depend around the support shank and brought into a usage position between the occupant and the front (side)  
20           windshield, and is used as an anti-glare member for partly blocking the eyesight of the occupant.

            The sun visor core is designed as an interior finishing member with its surface covered with a surface covering such as of fabric, leather, or the like. Since the sun visor is disposed in the passenger cabin at a convenient  
25           position that can easily be reached by the occupant, various accessories including a vanity mirror, a ticket holder, a clutter-catcher, etc, are added to

the sun visor core.

**【0004】**

Attempts have been made to improve the above conventional sun visor for better use as the anti-glare member, better design as the interior  
5 finishing member, and better convenience in combination with various accessories.

The inventors have conducted a detailed analysis of sound field environments in the passenger cabins of automobiles. The inventors have found as a result of the analysis that since sun visors of the above type are  
10 positioned very closely to the head of the occupant though their projected area into the passenger cabin is comparatively small, they have a possibility to function appropriately as an acoustic absorbent for improving the sound field environment around the occupant. As a consequence, the inventors have proposed in Japanese patent application Filling No. 2002-256799 a sun  
15 visor structure of high air permeability for significantly improving the sound field environment around the automobile occupant to make the automobile cabin quiet.

**【Patent Document 1】** Japanese patent application Filling No.  
2002-256799

20 **【Patent Document 2】** U.S. patent No. 5887933

**【Disclosure of the Invention】**

**【Problem to Be Solved by the Invention】**

**【0005】**

Japanese Patent application filling No. 2002-256799 is concerned with  
25 a structure wherein a core serving as a principal component of the sun visor is made of a foamed beads material to give a sun visor a sound absorbing

capability.

**【0006】**

The inventors disclose a sound absorbing capability to an automobile sun visor having a plate-like core that is produced, for example, by  
5 injection-molding a thermoplastic resin, particularly a so-called clam-shell type sun visor having a plate-like core which comprises a pair of plate-like core components having substantially equal contours and combined in interfitting engagement with each other.

**【0007】**

10 Such a clam-shell type sun visor is disclosed in U.S. patent No. 5887933. The sun visor has a sun visor core comprising face and reverse side plates having substantially equal contours and joined to each other by a hinge edge provided therebetween, the face and reverse side plates being folded back about the hinge edge and superposed one on each other to  
15 provide a single plate-like core. With this structure, since the plate-like core is rigid, it is of poor air permeability, and it was difficult in a prior art to give the plate-like core a sound absorbing capability. The inventors have made an intensive study as to a structure for giving a clam-shell type sun visor a high sound absorbing capability, and, as a result, have made the present  
20 invention.

**【0008】**

A sun visor employing a skeletal core of thermoplastic resin which has a relatively thick outer frame core and an inner core extending within the outer frame core, the inner core being thinner than the outer frame core, a  
25 structure, which is capable of giving a high sound absorbing capability, is also disclosed.

**[Means to Solve the Problem]**

**[0009]**

Means to solve the problem is a sun visor for an automobile comprising a shading plate-like core for use in the passenger cabin of the automobile, the sun visor is characterized in that the plate-like core has a plurality of micropores each having a diameter ranging from 1 to 5 mm and an open area ratio representing the ratio of the total area of the micropores to the projected area of the plate-like core ranges from 2 % to 30 %.

**[Effect of the Invention]**

**[0010]**

Heretofore, a clam-shell type sun visor is poor in air permeability for increasing a sound absorbing capability because its core is in the form of a plate-like core of resin. According to the present invention, the sound absorbing capability is increased by a number of micropores defined in the plate-like core.

**[0011]**

The plate-like core needs to have a certain level of rigidity in order to allow the sun visor to be operated easily. The inventors have studied diameters of micropores and open area ratios in order to increase the sound absorbing capability without sacrificing the rigidity, and have found optimum open area ratios. The inventors have also found that the sound absorbing capability can further be increased by covering the plate-like core with a covering member having a certain air permeability.

**[0012]**

There have been many automobiles wherein a sound absorbing ceiling finishing member incorporating a sound absorbent is mounted on the



ceiling in the cabin. If a sun visor having the structure of the present invention is used on such automobiles, then even when the sun visor core is held against the sound absorbing ceiling when the sun visor is not in use, there does not arise the problem that the sound absorbing capability of the ceiling finishing member is impaired by the sun visor as it covers the sound  
5 absorbing ceiling.

**【Best Mode for working the Invention】**

**【0013】**

A preferred embodiment according to the present invention is  
10 described below based on drawings.

Fig. 1 shows an example of a sun visor according to the present invention (exploded perspective view).

**【0014】**

Sun visor 1 according to an embodiment of the present invention  
15 mainly comprises plate-like core (sun visor core) 10 and L-shaped support shank 12 by which plate-like core 10 is rotatably supported on the ceiling of an automobile. Plate-like core 10 has a surface covered with covering member 18 of high air permeability.

**【0015】**

20 As shown in Fig. 1, the form of plate-like core 10 which is most suitable for the present invention has a member made up of face and reverse side plates 10a, 10b having substantially equal contours and joined to each other by hinge 11 provided therebetween. The member is folded back about hinge 11 to superpose face and reverse side plates 10a, 10b on each  
25 other, thereby providing single plate-like core 10. Face and reverse side plates 10a, 10b have mutually confronting surfaces having a plurality of

engaging pins 13 and engaging recesses 14 which are disposed in confronting positions. Face and reverse side plates 10a, 10b are brought into fitted engagement when engaging pins 13 engage in respective engaging recesses 14.

- 5           Face and reverse side plates 10a, 10b that are superposed on each other preferably have a flat hollow space defined therebetween, which preferably is filled with porous sound absorbent 30 such as felt or the like. Sound absorbent 30 has attachment holes 31 and has an outer profile complementary in shape to the hollow space. Therefore, sound absorbent
- 10   30 can be placed between face and reverse side plates 10a, 10b. Sound absorbent 30 also operates to reinforce the rigidity of plate-like core 10. If the space is filled with porous sound absorbent, it is preferably made of felt of chemical synthetic fiber, air-permeable formed resin material, or the like.

【0016】

- 15           Face and reverse side plates 10a, 10b of plate-like core 10 of sun visor 1 according to the present invention are preferably in the form of resin plates (having a thickness ranging from 1.5 to 3.0 mm) of polypropylene, ABS resin, nylon, or the like. Plate-like core 10 needs to have a certain level of rigidity when assembled, in order to allow sun visor 1 to be operated easily.
- 20   Specifically, when the occupant turns the sun visor from a usage position to a non-usage position (or from a non-usage position to a usage position), the occupant may possibly grip an end of plate-like core 10 which is remotest from support shank 12 about which plate-like core 10 is rotatable. In this occasion, if the plate-like core is not sufficiently rigid, the plate-like core may
- 25   flex between the end thereof and support shank 12.

【0017】

Face and reverse side plates 10a, 10b of plate-like core 10 have a number of micropores 17, 17' defined therein for increasing air permeability (sound absorbing capability). It has been experimentally confirmed that micropores 17, 17' should have a diameter ranging from 1 to 5 mm, and the number of micropores 17, 17', i.e., an open area ratio (P), i.e., the ratio of the total area (S1) of micropores 17, 17' to the projected area (S0) of plate-like core 10, should be  $(P) = (S1)/(S0)$  ranging from 2 % to 30 %.

The lower limit of the open area ratio (P) is 2 % because if the open area ratio is lower than the lower limit, the effect of increasing the sound absorbing capability drops sharply as observed from an evaluation of the sound absorbing capability.

Such an evaluation has been obtained as follows: A knit layer (air permeability: 150 cc/cm<sup>2</sup>/second) lined with a slab of urethane having a thickness of 2 mm which corresponds to the covering member on the face and reverse sides was prepared. Plates of polypropylene having a thickness of 1.5 mm and micropores having a diameter of 4.0 mm uniformly defined therein to provide a predetermined open area ratio, each of which corresponds to each of the face and reverse side plates of the plate-like core, were prepared. A felt of chemical synthetic fiber having a thickness of 18 mm (fiber diameter of 1.5 denier and density of 0.02 g/cm<sup>2</sup>), which corresponds to the porous sound absorbent, was prepared. These components were assembled into a structure corresponding to the plate-like core of the sun visor shown in Fig. 1. The assembled structure was used as a specimen for the evaluation of the sound absorbing capability, and tested to measure a sound absorption coefficient according to a normal-incidence sound absorption coefficient method. The results are shown in Fig. 3 as a

graph having a horizontal axis representing the open area ratio (P) and a vertical axis the sound absorption coefficient.

It can be seen from Fig. 3 that though there are slightly different tendencies at respective frequencies, the sound absorption coefficient is nearly 0 and no sound absorbing capability is obtained if the open area ratio of the plate-like core is 0 % at any frequencies, and the sound absorbing capability is greatly increased if the micropores are defined in the plate-like core to achieve an open area ratio in the range from 2 to 5 %. This appears to be because if the open area ratio is 0 %, no sound absorbing capability is achieved as sound waves are reflected by the surface of the plate-like core, and if the micropores are defined in the plate-like core, the sound absorbing capability is achieved due to the principles of Helmholtz in the internal space as sound waves penetrate into the interior of the plate like core. If the internal space is filled with the porous sound absorbent, then sound waves can penetrate more reliably into the sun visor. If the open area ratio is higher than 2 - 5 %, then the sound absorbing capability peaks out and does not tend to increase further. It was confirmed from the foregoing that the open area ratio should preferably be at least 2 % or higher.

[0018]

The upper limit of the open area ratio (P) is 30 % because if the open area ratio is higher than this upper limit, the flexural modulus is notably lowered and the rigidity (flexural modulus) required for plate-like core cannot be achieved.

Fig. 4 shows the relationship between the open area ratio (P) and the flexural modulus of a plate-like core in the form of a plate of polypropylene having a thickness of 1.5 mm. It can be seen from Fig. 4 that if the open

area ratio increases, the flexural modulus of the plate-like core tends to be gradually lowered, and the flexural modulus decreases at a greater rate as the open area ratio is higher, suggesting that the plate-like core fails to have a practical level of rigidity for use as the core of a sun visor.

5           Since it has experimentally been demonstrated that the flexural modulus of the plate-like core of the sun visor should preferably be 1400 MPa or greater, it has been confirmed that a practical range in which the flexural modulus of 1400 MPa or greater is obtained is a range in which the open area ratio (P) is 30 % or below.

10       **【0019】**

Each of micropores 17, 17' defined in the plate-like core 10 (face and reverse side plates 10a, 10b) should preferably have a diameter in the range from 1 to 5 mm. If the diameter is smaller than 1 mm, then it is unfavorably difficult to form each of the micropores, and the air permeability is lowered.

15       If the diameter of each of micropores 17 is in excess of 5 mm, then, less-preferably, the rigidity of plate-like core 10 near the micropores is partly lowered, and the plate-like core possibly flexes when the end of the plate-like core is gripped by the occupant to turn the sun visor.

Each of micropores 17 should preferably have a nearly circular or  
20       elliptical shape. If the micropores have sharp corners, then they unfavorably tend to allow the plate-like core to crack.

Micropores 17 is defined uniformly or nonuniformly in plate-like core  
10. It is experimentally determined to define a relatively large number of micropores at a position where a reduction in the rigidity of plate-like core 10  
25       is small and the effect of increasing the sound absorbing capability is high. Generally, it is preferable to define a relatively large number of micropores 17,

17' centrally in plate-like core 10 than peripherally in plate-like core 10.

[0020]

With plate-like core 10 being constructed of face and reverse side plates 10a, 10b, micropores 17 (17') should be defined in at least one of face  
5 and reverse side plates 10a, 10b. A higher sound absorbing capability is achieved if the micropores are defined in the side plate which faces the occupant when sun visor is turned to the non-usage position along the ceiling.

If the micropores are defined both face and reverse side plates 10a,  
10 10b of plate-like core 10, then micropores 17 in face side plate 10a and micropores 17' in reverse side plate 10b should preferably be positioned out of alignment with each other as viewed in a direction perpendicular to the surface of plate-like core 10. Advantages accruing from micropores 17, 17' defined in the face and reverse side plates out of alignment with each other  
15 are as follows:

With respect to the sound absorbing function, when sun visor is in the non-usage position, the path of sound waves traveling through the internal space of the plate-like core in the route from micropores 17 in the face side plate through micropores 17' in the reverse side plate to the internal finishing  
20 member of the ceiling can be longer if micropores 17, 17' are positioned out of alignment with each other than if they are positioned in alignment with each other. Micropores 17, 17' thus positioned out of alignment preferably allow the sound waves to act greatly on the filling porous sound absorbent. A preferable shading capability is also achieved if micropores 17, 17' are  
25 positioned out of alignment with each other. This is because the transmission of light rays and the transparency of the covering member can

be unfavorably reduced by positioning micropores 17, 17' out of alignment with each other.

[0021]

5 The outer circumference of plate-like core 10 is covered with covering member 18 for better design.

It has experimentally confirmed that covering member 18 used in the present invention should preferably be highly permeable to air with air permeability of  $6 \text{ cc/cm}^2/\text{second}$  or higher. Unless the air permeability is equal to or higher than  $6 \text{ cc/cm}^2/\text{second}$ , sound waves are unfavorably less  
10 liable to enter the micropores defined in the plate-like core, resulting in a reduction in the sound absorbing capability. Preferably, the covering member comprises a fiber-constructed member such as a non-woven fabric covering member, a knit covering member, or a textile fabric covering member. For better design, the covering member needs to have a unit area  
15 weight large enough for the occupant to fail to see micropores 17, 17' defined in the plate-like core through the covering member.

[0022]

In Fig. 1, U-shaped spring indicted with reference number 15 is mounted around the outer circumferential surface of support shank 12 in  
20 order to generate biasing forces and to causes the plate plate-like core to turn in stages. U-shaped spring 15 is placed in housing 16 that is integrally formed with face side plate 10a or reverse side plate 10b of plate-like core 10. Opening 10 is defined in the boundary between face and reverse side plates 10a, 10b across hinge 11 serves to support a knob (not shown) for giving  
25 assistive support to the plate-like core, in a position exposed out of plate-like core 10.

【0023】

A specific mode of using the sun visor according to the present embodiment in an automobile will be described below with reference to Fig. 2.

5 Fig. 2 is a cross-sectional view showing the sun visor constructed by assembling the plate-like core and other components and mounted on the ceiling of an automobile (non-usage position  $S_1$  and usage position  $S_2$ ).

【0024】

When sun visor 1 according to the present embodiment is in use,  
10 plate-like core 10 is rotated to depend downwardly around support shank 12 and brought into the position between the occupant and the front windshield, and is used as an anti-glare member for blocking light from a front light source.

The ceiling of the automobile generally has ceiling finishing member  
15 41 disposed beneath and along roof panel 40. Ceiling finishing member 41 serves to cover roof panel 40 to provide a decorative design for the covered area. Ceiling finishing member 41 comprises base 41a having certain rigidity and covering member 41b covering the interior side of base 41a. Ceiling finishing member 41 has an attachment hole defined partly therein for  
20 the support shank of the sun visor. L-shaped support shank 12 of sun visor 1 is angularly movably supported by bracket 42 for angular movement about bracket 42.

Plate-like core 10 of the sun visor is rotatable about support shaft 12, and can rotate from non-usage position  $S_1$  along the ceiling finishing member  
25 to usage position  $S_2$  depending between occupant M and the front windshield.



【0025】

Occupant M usually does not bring sun visor 1 into usage position  $S_2$  in most time zones, and plate-like core 10 of the sun visor remains disposed in non-usage position  $S_1$  along ceiling finishing member 41. In this position,  
5 sun visor 1 for an automobile according to the present invention has a high sound absorbing capability, and particularly functions best if ceiling finishing member 41 has a high sound absorbing capability (high air permeability).

Ceiling finishing member 41 which is particularly suitable for the present invention has its base 41a and covering member 41b made of a  
10 highly air-permeable material, and provides a high sound adsorbing capability due to the air permeability. If the sun visor of the high sound absorbing capability according to the present invention is combined with the ceiling finishing member of the high sound absorbing capability, then the sound field environment around occupant M in the cabin below ceiling the  
15 finishing member and the sun visor is greatly improved due to the synergic effect.

【0026】

Specifically, as shown in Fig. 2, wind noise produced as the vehicle travels enters into the passenger cabin of the automobile near the ceiling,  
20 and is irregularly reflected by an inner cabin surface of the automobile to occupant M as schematically indicated by  $N_1$ : At this time, if ceiling finishing member 41 which is positioned closely to the head of the occupant and has a large projected area has the high sound absorbing capability as described above, then it reduces the reflection of the sound waves from the surface of  
25 the ceiling finishing member, and the sound waves penetrate into the ceiling finishing member wherein the energy of the sound waves is absorbed, thus

minimizing sound waves traveling toward the occupant, as is known in the art.

If sun visor 1 according to the present invention is positioned on the interior side of ceiling finishing member 41 of the high sound absorbing capability, as shown in Fig. 2, then in an area where sun visor 1 is located, sound waves  $N_2$  enter the sun visor and their energy is absorbed thereby. Part of the sound waves that have entered sun visor 1 travel through the plate-like core and reach ceiling finishing member 41 wherein they are further absorbed by the structure of ceiling finishing member 41 described above which has the high sound absorbing capability.

In the position where sun visor 1 is present, the sound absorbing effect of the sun visor and the sound absorbing effect of ceiling finishing member 41 of the high sound absorbing capability are combined with each other to produce a preferable synergic effect. (Even if the ceiling finishing member does not have the high sound absorbing capability described above, the sun visor according to the present invention is solely capable of greatly effecting the occupant because the sun visor is positioned extremely closely to the head (ears) of the occupant though its projected area is small.)

With the conventional automobile sun visors, however, sound waves that penetrate into the sun visor are of a very low proportion, and most sound waves are reflected by the sun visor. Therefore, even if the ceiling finishing member is of a high sound absorbing capability, its effect is impaired.

[0027]

With respect to the shading function, when the sun visor is positioned into usage position  $S_2$  for shading incident light rays  $L$  from face side plate 10a, since covering member 18 is highly permeable to air and thin according

to the present invention, if micropores 17 in the face side plate and micropores 17' are positioned in alignment with each other as viewed in a direction perpendicular to the surface, then incident light rays L enter through micropores 17 in face side plate 10a into plate-like core 10, and pass through micropores 17' in reverse side plate 10b toward occupant M at a high ratio. Therefore, occupant M may possibly see micropores 17' defined in plate-like core through covering member 18, resulting in an unfavorable appearance.

If micropores 17 in face side plate 10a and micropores 17' in reverse side plate 10b are positioned out of alignment with each other as viewed in a direction perpendicular to the surface, then the ratio at which the light rays pass through the plate-like core is advantageously reduced as much as possible.

**【Examples】**

**【0028】**

Structure of a sun visor according to a specific example:

A sun visor according to a specific example comprises a plate-like core in the form of a clam shell of polypropylene (having a thickness of 2.5 mm) having face and reverse side plates having substantially equal contours and joined to each other by a hinge, the face and reverse side plates being superposed on each other. The plate-like core has a profile represented by a substantially elongate rectangular shape having a size of 19 cm by 46 cm and has a projected area of 790 cm<sup>2</sup>. A hollow space having a thickness of 20 mm is defined between the face and reverse side plates of the plate-like core.

The face and reverse side plates have a number of circular micropores each having a diameter of 3.0 mm and uniformly arranged in a

staggered pattern at a density of 1.4 micropores/cm<sup>2</sup>. (The micropores in the face and reverse side plates are disposed out of alignment with each other as viewed in a direction perpendicular to the surface of the plate-like core.) The total area of the micropores is 78.7 cm<sup>2</sup>, and the open area ratio (P) is 10.0 %.

The plate-like core has a flexural modulus of 1780 MPa, which provides a rigidity required for the sun visor.

The outer surface of the sun visor is covered with a covering member made of PET. The covering member has an air permeability of 150 cc/cm<sup>2</sup>/s (JISL-1096).

**[0029]**

Structure of a comparative sun visor:

A comparative sun visor has a plate-like core in the form of a clam shell similar to the sun visor according to the specific example of. However, the clam shell of the comparative sun visor differs from the clam shell of the sun visor according to the specific example in that it has face and rear side plates free of micropores and an open area ratio (P) of 0 %.

The plate-like core has a flexural modulus of 1840 MPa, which has a rigidity required for the sun visor.

The outer surface of the sun visor is covered with a covering member which is the same as with the specific example.

**[0030]**

Sound absorbing capability evaluation process:

A sedan-type middle-size passenger automobile was used, and the sun visor according to the specific example of the present invention and the comparative sun visor were disposed in non-usage position S<sub>2</sub> shown in Fig.

2. A speaker was placed at a position 1 m ahead of the A pillar, and radiated random noise. A noise level at the height of the ear position of the occupant was measured to confirm how wind noise was propagated to the occupant in the automobile cabin.

5 The automobile under test had an air-permeable ceiling finishing member of a high sound absorbing type.

[0031]

Results of the evaluation:

Fig. 5 is a graph showing measured results.

10 The dotted-line curve represents the measured results of the evaluation with respect to the sun visor according to the specific example of the present invention, and the solid-line curve the measured results of the evaluation with respect to the comparative sun visor.

15 On the vehicle equipped with the sun visor according to the specific example of the present invention, the noise level at the ear position of the occupant was reduced in a wide frequency range and, particularly, was a maximum of about 1.7 dB lower than on the vehicle equipped with the comparative sun visor in the vicinity of 2500 Hz. Therefore, the sound absorbing effect of the sun visor according to the present invention was confirmed.

20 [0032]

Fig. 6 shows another preferred embodiment of the present invention.

Sun visor 50 according to the present embodiment has a core comprising skeletal core 50 (of thermoplastic resin and having relatively thick outer frame core 51a and inner core 51b extending within outer frame core 51a). Skeletal core 51 is covered with covering member 52 which is

highly permeable to air (a laminated body of design layer 52a of nonwoven fabric or the like and padding layer 52b of slab urethane foam or the like).

In the present embodiment, the core of the sun visor is skeletal to increase the air permeability of the sun visor for an increased sound  
5 absorbing capability, as with the clam-shell type sun visor with the micropores as described above.

The plate-like core may be made of corrugated cardboard surrounded by a metal frame along the outer circumferential edge of the sun visor, rather than thermoplastic resin, with the outer surface of the core being covered  
10 with a covering member. This alternative sun visor can also have a sound absorbing capability by using a structure in which air permeability is increased as with the above.

#### **【Brief Description of the Drawings】**

**【0033】**

15 **【Fig.1】** Fig. 1 is an exploded perspective view of a sun visor according to the present invention.

**【Fig.2】** Fig. 2 is a cross-sectional view of the sun visor according to the present invention obtained by assembling plate like cores as it is mounted on the ceiling of an automobile (non-usage position  $S_1$ ).

20 **【Fig.3】** Fig. 3 is a graph showing how the sound absorption coefficient varies depending on the open area ratio.

**【Fig.4】** Fig. 4 is a graph showing how the flexural modulus varies depending on the open area ratio.

**【Fig.5】** Fig. 5 is a graph showing the results of a noise level evaluation of  
25 an actual automobile

**【Fig.6】** Fig. 6 is a perspective view, partly broken away, of a sun visor

according to another embodiment of the present invention.  
Best mode for carrying out the invention.

**【Description of Numbers】**

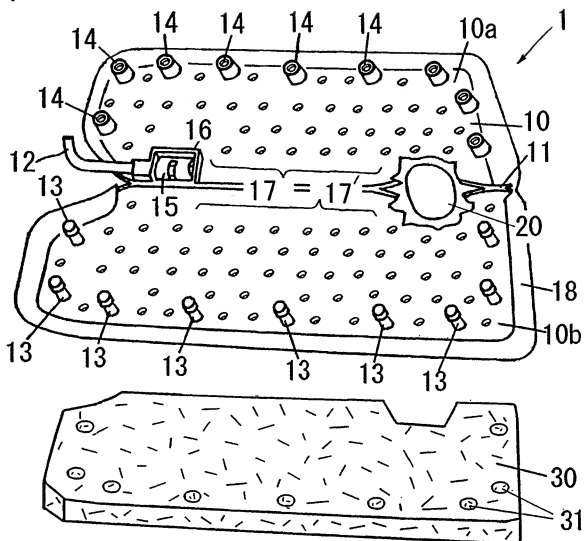
**【0034】**

- 5     1    sun visor
- 10   plate-like core
- 10a   face side plate
- 10b   reverse side plate
- 11    hinge
- 10    12    support shank
- 13    engaging pin
- 14    engaging recess
- 15    U-shaped spring
- 16    housing
- 15    17, 17'   micropore
- 18    covering member
- 20    opening
- 30    sound absorbent
- 31    attachment hole
- 20    40    roof panel
- 41    ceiling finishing member
- 41a   base
- 41b   covering member
- 50    sun visor
- 25    51    skeletal core
- 51a   outer frame core

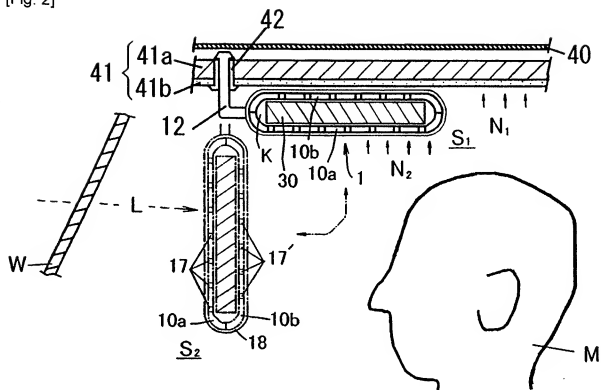
51b inner core

52 covering member

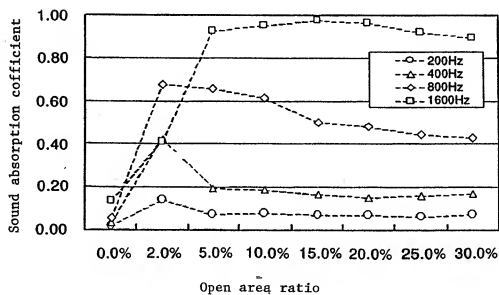




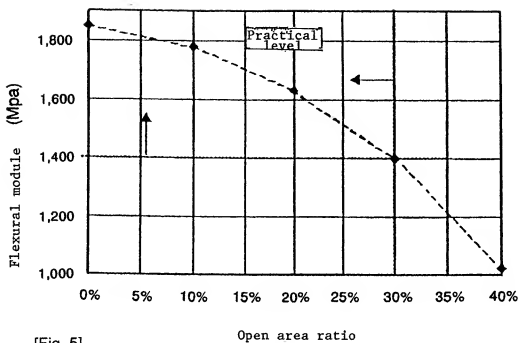
[Fig. 2]



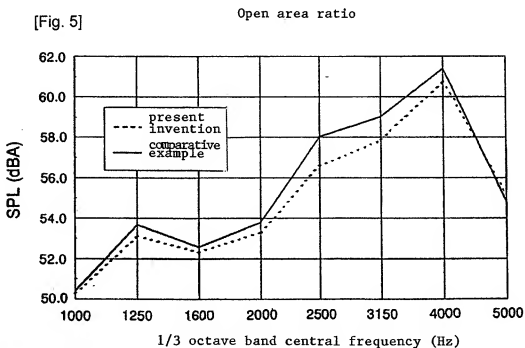
[Fig. 3]



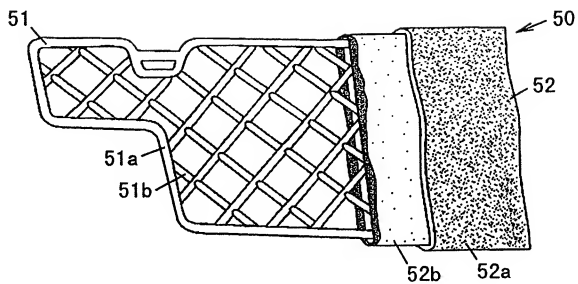
[Fig. 4]



[Fig. 5]



[Fig. 6]



**【Document Name】** Abstract

**【Abstract】**

**【Object】** To provide a structure which is capable of giving a high sound absorbing capability to a sun visor for automobile that is produced by injection-molding a thermoplastic resin.

**【Means for solution】** A sun visor for an automobile is characterized in that the sun visor has a plate-like core, air permeability of which is increased by being provided with multiple micropores each having a diameter ranging from 1 to 5 mm, wherein an open area ratio representing the ratio of the total area of micropores to the projected area of the plate-like core ranges from 2% to 30%, alternatively, the sun visor has a skeletal core having an air permeability equal to that of the plate-like core, wherein the plate-like core or the skeletal core is covered with a covering member having a high air permeability.

**【Selected Figure of the Drawings】** Fig. 1